

Appl. No.: 10/797,748  
RCE and Amendment dated 04/27/2006

Patent  
51302-00002

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1- 25 (CANCELLED)

26. (PREVIOUSLY PRESENTED) A device for removing at least one metal from a substrate comprising:

a support having at least one substantially pure metallothionein (MT) protein bound to said support such that said substrate can be contacted with said at least one MT protein such that said metal binds to said at least one MT protein derived from the brine shrimp genus *Artemia* and are removed from said substrate.

27. (CANCELED)

28. (PREVIOUSLY PRESENTED) The device according to claim 26 wherein said at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 2.

29. (PREVIOUSLY PRESENTED) The device according to claim 26 wherein said at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 4.

30. (PREVIOUSLY PRESENTED) The device according to claim 26 wherein said substrate is selected from the group consisting of water, soil and sludge.

31. (PREVIOUSLY PRESENTED) The device according to claim 26 wherein said at least one metal removed from said substrate is selected from the group consisting of gold, silver, platinum, zinc, copper, cadmium, mercury, nickel, lead, cobalt, their radioactive isotopes and combinations thereof.

32. (PREVIOUSLY PRESENTED) The device according to claim 26 wherein said support is selected from the group consisting of matrices, membranes, semi-permeable membranes, powders and resins.

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33. (PREVIOUSLY PRESENTED) A device for removing at least one metal from a substrate comprising:

a support having at least one substantially pure *Artemia* metallothionein (MT) protein bound to said support such that said substrate can be contacted with said at least one MT protein such that said metal binds to said at least one MT protein and are removed from said substrate.

34. (PREVIOUSLY PRESENTED) The device according to claim 33 wherein said at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 2.

35. (PREVIOUSLY PRESENTED) The device according to claim 33 wherein said at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 4.

36. (PREVIOUSLY PRESENTED) The device according to claim 33 wherein said support is selected from the group consisting of matrices, membranes, semi-permeable membranes, powders, and resins.

37. (PREVIOUSLY PRESENTED) A device for removing at least one metal from a substrate comprising:

a support having at least one substantially pure *Artemia* metallothionein (MT) protein bound to said support such that said substrate can be contacted with said at least one MT protein such that said metal binds to said at least one MT protein and is removed from said substrate and wherein said at least one MT protein comprises the amino acid sequence according to SEQ. ID. NO: 2 or SEQ. ID NO: 4.

38. (PREVIOUSLY PRESENTED) The device according to claim 37 wherein said substrate is selected from the group consisting of water, soil and sludge.

39. (PREVIOUSLY PRESENTED) The device according to claim 37 wherein said at least one metal removed from said substrate is selected from the group consisting of gold, silver, platinum, zinc, copper, cadmium, mercury, nickel, lead, cobalt, their radioactive isotopes and combinations thereof.

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40. (PREVIOUSLY PRESENTED) The device according to claim 37 wherein said support is selected from the group consisting of matrices, membranes, semi-permeable membranes, powders and resins.

41. (PREVIOUSLY PRESENTED) A device for removing at least one metal from a substrate comprising:

a membrane having at least one substantially pure *Artemia* metallothionein (MT) protein bound to said membrane such that said substrate can be contacted with said at least one MT protein such that said metal binds to said at least one MT protein and are removed from said substrate.

42. (PREVIOUSLY PRESENTED) The device according to claim 41 wherein said at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 2.

43. (PREVIOUSLY PRESENTED) The device according to claim 41 wherein said at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 4.

44. (PREVIOUSLY PRESENTED) The device according to claim 41 wherein said substrate is selected from the group consisting of water, soil and sludge.

45. (PREVIOUSLY PRESENTED) The device according to claim 41 wherein said at least one metal removed from said substrate is selected from the group consisting of gold, silver, platinum, zinc, copper, cadmium, mercury, nickel, lead, cobalt, their radioactive isotopes and combinations thereof.

46. (PREVIOUSLY PRESENTED) A device for removing at least one metal from a substrate comprising:

a membrane having at least one substantially pure *Artemia* metallothionein (MT) protein bound to said membrane such that said substrate can be contacted with said at least one MT protein such that said metal binds to said MT protein and is removed from said substrate and wherein said at least one MT protein comprises the amino acid sequence according to SEQ. ID. NO: 2 or SEQ. ID NO: 4.

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47. (PREVIOUSLY PRESENTED) A method for removing at least one metal from a substrate comprising:

providing a support having at least one metallothionein (MT) protein attached to said support;

contacting a substrate having at least one metal therein with said support such that said at least one metal binds to said at least one MT protein;

separating said support having said at least one metal bound to said at least one MT protein from said substrate; and

recovering said at least one metal from support such that said at least one metal is removed from said substrate.

48. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 47 wherein said providing step further comprises deriving said at least one substantially pure MT protein from the brine shrimp genus *Artemia*.

49. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 48 wherein said *Artemia*-derived at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 2.

50. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 48 wherein said *Artemia*-derived at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 4.

51. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 47 wherein said contacting step further comprises contacting a substrate selected from the group consisting of water, soil and sludge with said support having said MT protein therein.

52. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 47 wherein said at least one metal recovered from said substrate is selected from the group consisting of gold, silver, platinum, zinc, copper,

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cadmium, mercury, nickel, lead, cobalt, their radioactive isotopes and combinations thereof.

53. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 47 wherein said provided support is selected from the group consisting of matrices, membranes, semi-permeable membranes, powders and resins.

54. (PREVIOUSLY PRESENTED) A method for removing at least one metal from a substrate comprising:

providing a membrane having at least one *Artemia*-derived metallothionein (MT) protein attached to said support;

contacting a substrate having at least one metal therein with said membrane such that said at least one metal binds to said at least one *Artemia*-derived MT protein;

separating said membrane having said at least one metal bound to said at least one *Artemia*-derived MT protein from said substrate; and

recovering said at least one metal from membrane such that said at least one metal is removed from said substrate.

55. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 54 wherein said *Artemia*-derived at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 2.

56. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 54 wherein said *Artemia*-derived at least one substantially pure MT protein comprises the amino acid sequence according to SEQ. ID NO: 4.

57. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 54 wherein said contacting step further comprises contacting a substrate selected from the group consisting of water, soil and sludge with said support having said MT protein therein.

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58. (PREVIOUSLY PRESENTED) The method for removing at least one metal from a substrate according to claim 54 wherein said at least one metal recovered from said substrate is selected from the group consisting of gold, silver, platinum, zinc, copper, cadmium, mercury, nickel, lead, cobalt, their radioactive isotopes and combinations thereof.

59. (PREVIOUSLY PRESENTED) A method for removing at least one metal from a substrate comprising:

providing a membrane having at least one *Artemia*-derived metallothionein (MT) protein attached to said support, wherein said *Artemia*-derived MT protein comprises the amino acid sequence according to SEQ. ID. NO: 2 or SEQ. ID NO: 4;

contacting a substrate having at least one metal therein with said membrane such that said at least one metal binds to said at least one *Artemia*-derived MT protein;

separating said membrane having said at least one metal bound to said at least one *Artemia*-derived MT protein from said substrate; and

recovering said at least one metal from membrane such that said at least one metal is removed from said substrate.